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THE OPERATIVE TREATMENT OF PARALYTIC TALIPES OF THE CALCANEUS TYPE.[1]

By Royal Whitman, M.D.,
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Paralytic talipes calcaneus is, as the name implies, that form of talipes characterized by a prominent heel. It is, however, far more important as a disability than as a deformity, for its cause is the loss of the principal lifting and propelling force of the body—the calf muscle. When this muscle is paralyzed the os calcis, deprived of its support, sinks downward and assumes by degrees a more or less vertical position, its posterior surface becoming inferior. Thus the distance between the ankle-joint and the bearing surface of the heel is increased. There is not, however, except in advanced cases, persistent dorsal flexion of the foot, as is sometimes seen in the congenital form, because this attitude is opposed by the force of gravity.

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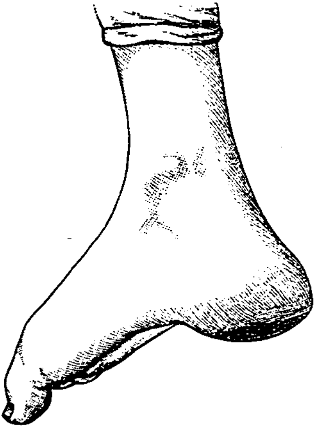
[1] Read before the American Orthopedic Association, 1901.

The most noticeable of the secondary deformities is the exaggeration of the longitudinal arch. This is caused by the approximation of the anterior and posterior supports of the foot, by the action and retraction of the remaining muscles, and by the adaptive shortening of the other tissues. These secondary changes are in great degree the effect of functional use, and are, therefore, most marked when the foot has been used for a long time without adequate mechanical protection. (Fig. 1.)

FIG. 1.



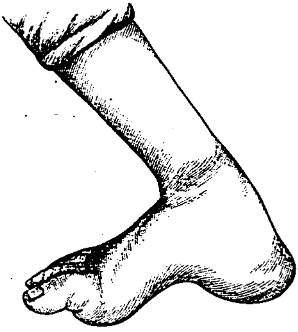
Talipes calcaneus due to paralysis of the calf muscle (gastrocnemius and soleus), illustrating the typical deformity of moderate degree.

In cases of this character, with which this paper is chiefly concerned, the patient, to all intents hamstrung, stamps about on his heel very much as one would after a Pirogoff amputation, but with the added disadvantage of the insecurity due to the uncontrolled movement at the ankle-joint. The forefoot serves no function other than to fill the shoe, and in advanced cases it becomes simply an atrophied appendage suspended from the elongated and pad-like heel.

In anterior poliomyelitis the affection, which in all but very exceptional cases is the cause of the deformity under consideration, the paralysis is by no means always limited to the calf muscle; in many instances the adductors or abductors are involved, with consequent lateral distortion. Of this type calcaneo-valgus is the most common and the most important. (Fig. 2.)

If the calf muscle alone is paralyzed, the damage to the spinal cord being limited in area, the growth of the limb is not particularly affected, nor is the circulation greatly impaired. And, although the power of the other muscles of the posterior group is of little value as far as function is concerned, the foot remains far more normal in contour and life-like in appearance than when the paralysis is more extensive. In almost every instance, however, the growth of the foot is retarded, far more so than when the muscles of the anterior group are paralyzed. This is a striking example of the effect of loss of function on development.

FIG. 2.



Talipes calcaneo-valgus. In this form the adductors of the foot (tibialis anticus and posticus) as well as the calf muscle are paralyzed.

As has been stated, deformity is favored and induced by functional use, and, while it may be admitted that efficient protection would in great degree prevent the secondary and characteristic distortions, yet the general results of mechanical treatment, judged from actual observation, are very unsatisfactory.

The reason is apparent. When the anterior muscles are paralyzed the function of the brace is simply to prevent toe-drop, but when the power of the calf muscle is lost the support must withstand the weight of the body and the strain of locomotion. Under this strain the springs and elastic bands, so often employed with the aim of replacing muscular action, give way, and even braces of more solid construction bend and break with discouraging frequency.

The expense of apparatus and the constant need of repairs account doubtless for the fact that, in the majority of cases, braces are inefficient, or are worn intermittently, or are discarded altogether; consequently the deformity develops, often to an extreme degree. This is especially true of the cases of calcaneo-valgus because of the difficulty of controlling the lateral deformity and because of the discomfort often caused by the restraining support.

It is in cases of this type that one turns to operative treatment in the hope of palliating the disability, of restoring the symmetry of the foot, or, at least, of making support less burdensome and more effective.

In the consideration of this form of treatment tenotomies, forcible correction and the like, which are undertaken simply to overcome secondary deformity, do not require comment. The other procedures which are at the present time advocated are Willett's operation and its modifications, tendon transplantation, and arthrodesis. These may be considered in order.

WILLETT'S OPERATION consists essentially in dividing and shortening the tendo Achillis, together with the overlying fascia and skin on the back of the ankle, sufficiently to hold the foot at a right angle with the leg, or, as modified by Gibney, in an attitude of plantar reflexion as extreme as is practicable. The object of this operation is to oppose the resistance of the non-contractile tissues on the back of the leg to the deforming influence of functional use. Further experience has shown that except in those cases in which contractile power remains in the calf muscle the procedure, even from the palliative stand-point, is of little service other than as a means of restoring temporarily the symmetry of the foot. Furthermore, when the foot is inclined toward varus or valgus the operation is contraindicated, as the shortened tissues on the posterior aspect of the limb would tend to exaggerate the lateral deformity.

The operation of sawing off the posterior extremity of the os calcis and displacing it further downward, as suggested by Walsham, is simply another method of shortening the tendo Achillis, which has little to recommend it.

TENDON TRANSPLANTATION. It is interesting to note that the first operation of tendon transplantation was performed by Nicoladoni for the relief of this deformity, the two lateral peroneii being inserted into the tendo Achillis. Yet this is the condition of all others for which the procedure, from a curative stand-point, is of least value. The calf muscle is nearly double the strength of all the other muscles of the foot combined, and more than ten times as strong as the two muscles which were used to replace it.

It is evident, then, that tendon transplantation finds its proper place as a palliative operation which may be of advantage when one can change a force that distorts the foot to a position in which it may be of service even if slight.

ARTHRODESIS. This operation is performed with the aim of establishing a firm right angular ankylosis at the ankle-joint, thus allowing the patient to dispense with apparatus.

Arthrodesis at the ankle-joint is of little value when lateral distortion is present. In such cases the operation must include the subastragaloid and medio-tarsal joints also. In any event arthrodesis is likely to be disappointing if performed in childhood, as growing bone can hardly restrain so marked a tendency toward deformity. If, then, apparatus must be employed in the after-treatment, absolute fixation is undesirable because of the increase of the muscular atrophy that is likely to follow and because a certain elasticity at this joint lessens the strain upon it.

This sketch of the operative treatment presents fairly, I think, the inadequacy of each of the procedures that are recommended for the relief of this affection. Indeed, an analysis of the disability should make this evident without the test of actual experience. As has been stated, the disability of calcaneus depends in very great degree upon the insecurity of the foot. This insecurity, although caused directly by the paralysis, is greatly exaggerated by the fact that the weight must be supported on the astragalus perched upon the displaced os calcis, and the instability is, of course, increased when there is lateral distortion of the foot.

The most effective remedy, therefore, must be removal of the astragalus. Sufficient mobility is thus gained to allow of a backward displacement of the foot upon the leg, so that the body-weight, instead of falling upon an elongated heel practically in the plane of the flattened calf, is advanced toward the centre of the foot. Thus the adverse leverage which tends toward recurrence of deformity is lessened, and the symmetry of the distorted part in great degree is restored. Incidentally one or all of the procedures that have been described may be indicated as a subsidiary part of the treatment. In fact, the operation that I have usually performed for the relief of calcaneo-valgus might be described as astragalectomy, arthrodesis, tendon shortening, tendon transplantation, and backward displacement of the foot, the first and last of these being by far the most important, in that the chief cause of the insecurity is removed by lowering and carrying forward the articulation between the leg and the foot.

The details of the operation are in brief as follows: A long curved incision is made below the external malleolus from the tendo Achillis behind to the head of the astragalus in front. The two peroneii tendons are freed and are either divided or displaced backward; the astragalus is then exposed and its extraction is usually made comparatively easy after the interosseous ligament has been divided by forcibly displacing the foot inward. The cartilage is then removed from the surfaces of all the adjacent bones; the tendo Achillis is shortened if it is longer than the new position of the foot will require, and into it are inserted and attached the proximal ends of the tendons of the two peroneii muscles, which in cases of calcaneo-valgus usually retain their power—a power that serves no useful purpose, but is simply an agent of deformity. The wound is then closed and the foot is displaced backward so that the internal malleolus is brought into contact with the

FIG. 3.

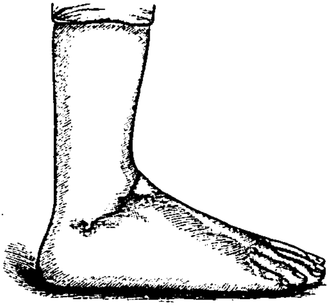
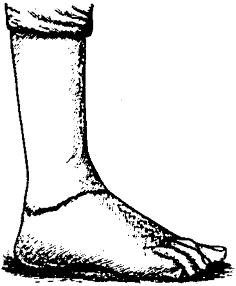


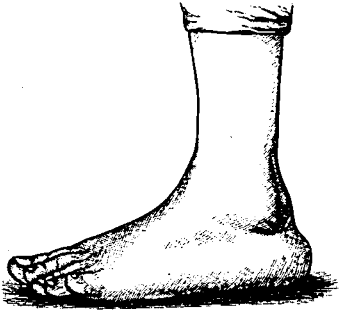
FIG. 4.



scaphoid bone, and a plaster bandage is applied, fixing the foot in an attitude of slight plantar flexion. (Figs. 3, 4, and 5.)

The operation may be most conveniently performed under the Esmarch bandage, the pressure being finally relaxed, so that bleeding points in the skin may be secured. Subsequently the limb is elevated for a time to lessen the oozing from the denuded bones. Drainage is unnecessary. The plaster bandage remains until the parts are firmly healed, the patient being encouraged to use the foot as soon as pressure causes no discomfort, usually in from one to three weeks after the operation. In none of the operations, thirteen in number, that I have performed has there been wound infection, and the only mishap was a superficial sloughing of the skin due to a tight bandage. This, however, in no way interfered with the success of the operation.

FIG. 5.

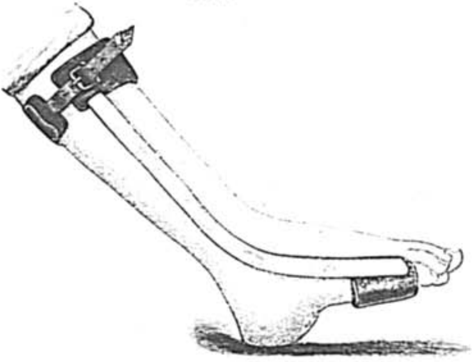


Figs. 3, 4, and 5 illustrate the effect of operative treatment in cases of paralytic talipes calcaneo-valgus.

Although the cartilage is removed from the bones, one must not expect absolute ankylosis, as the apposition of the parts is not sufficiently perfect to assure it. In fact, as has been stated, the limited motion that remains is desirable, especially in those cases in which considerable muscular power remains, as it lessens the direct strain upon the ankle. Apparatus to prevent deformity has been employed in all cases, although the patients can walk without it very well, and it may be that in time it can be discarded.

Recently I have employed a support which seems to be a great improvement over those that I formerly used. A plaster cast of the foot and leg is made with the part in the proper attitude, and on this the brace is modelled. It consists essentially of two light curved steel bars passing from the middle of the lateral aspect of the upper quarter of the leg downward on either side, in front of or over the malleoli to the metatarso-phalangeal joints. These bars are attached to one another below by a curved foot-plate as wide as the bearing surface of the anterior part of the foot, and above by another steel band of similar width which passes across the front of the leg in the neighborhood of the tubercle of the tibia. This is suitably padded, the circumference at this point being completed by a strap about the calf. An elevation of cork or rubber is placed in the back of the shoe to support the foot in the attitude of slight plantar flexion, corresponding to the cast. A similar thickening of the heel of the shoe, sufficient to induce very slight flexion at the knee, is of advantage also in counteracting the tendency to recurvation, which is present in certain cases. It also serves to lengthen the limb, which is usually somewhat shorter than its fellow. This brace, which is held firmly in its place by the shoe, is inconspicuous, simple in construction, and much more resistant than the ordinary brace, as the strain upon it is comparatively slight. There is consequently no likelihood of slackened straps, or of distorted uprights, or of broken foot-plates. Its use is, of course, not limited to operative cases; but as this paper is especially concerned with this class I need not consider further details of mechanical treatment, except to call attention to the fact that the gait of the wearer of a wooden leg for an amputation below the knee is far better than in the majority of cases in which the essential muscles that control the foot are paralyzed. The greater,

FIG. 6.



An effective brace for talipes calcaneus.

therefore, the approximation to the security assured by the artificial member, the greater will be the improvement in locomotion. This is a fact not generally recognized in the construction of the ordinary brace.

It is not my purpose to urge operative treatment for all cases of calcaneus, but simply to suggest an effective procedure for those cases in which, for one reason or another, mechanical treatment is inefficient —a class which, in hospital practice at least, is a very large one.

THE DIFFICULTIES IN MAKING A DIAGNOSIS IN THE BONE LESIONS OF NURSLINGS.[1]

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The title of this paper suggested itself to me on account of the paucity of symptoms presented by several cases in babies in my wards during the past year which rendered an early and definite diagnosis most difficult and unsatisfactory. I present it in the hope that the discussion which it may bring forth from my fellow-members, together with observations I myself may make, will add somewhat to our means of making a more definite and an earlier diagnosis.

By nurslings I have meant to convey those babies under two years of age who are either breast-fed or bottle-fed, and in whom dentition has not begun or is only partially completed. However, the limitation need not be made, as many of the symptoms and blood changes to be spoken of occur in young children as well as infants.

On being called to see a baby with one or more of the cardinal symptoms of bone inflammation certain of the following formidable array of diseases may present themselves to the clinician for differentiation and exclusion, viz.: tuberculous osteomyelitis or epiphysitis, syphilitic periostitis and osteochondritis, achondroplasia, rhachitic proliferation, softening or eburnation, scorbutic subperiosteal hemorrhage, or, perhaps, epiphyseal separation, osteosarcoma, epithelioma (?), rheumatism, "growing pains," rheumatoid arthritis, acute anterior poliomyelitis, acute osetomyelitis, acute arthritis, and also influenza, typhoid infection, colon infection, and pneumococcus infections; osteomata, whether exostoses or hyperostoses; osteopsathyrosis, spontaneous fractures, and cysts.

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[1] Read before the American Orthopedic Association, 1901.